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Indian Standard

METHOD FOR UPSETTING TEST ON METALLIC MATERIALS

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METHOD FOR UPSETTING TEST ON METALLIC MATERIALS

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Indian Standard

METHOD FOR UPSETTING TEST ON METALLIC MATERIALS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 April 1982, after the draft finalized by the Methods of Physical Tests Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard has been prepared to establish a uniform procedure for conducting the upsetting test on metallic materials. This test is generally carried out on finished products (bars, rods, etc) for determining the surface quality of the material, and is also sometimes known as the ' Dump Test '.

0.3 Certain requirements have to be specified in the material specification where reference has been made to this standard. For convenience of reference, these requirements have been summarized and included in Appendix A.

0.4 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes the method for carrying out upsetting test on metallic materials.

2. PRINCIPLE OF TEST

2.1 The test consists of reducing the length of the test piece under uniform application of axial compressive load to evaluate surface quality of the material.

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*Rules for rounding off numerical values (*revised*).

3. TEST PIECE

3.1 The test piece shall normally be from the finished materials. Both the faces of the test piece shall be properly machined to ensure axial loading while under test. The length of the test piece shall be twice its diameter (in the case of other sections, minor sectional dimensions shall be considered) unless otherwise specified in the appropriate standard.

3.2 In case of wire rods in coil form, if required may be straightened by applying tensile load up to 0·5 percent extension to avoid buckling.

3.3 For bars over 30 mm in diameter a co-axial hole may be drilled on the test piece to reduce its cross-section to suit the capacity of the testing machine provided no 'cave-in' is found after testing.

4. COLD UPSETTING

4.1 Testing Machine — The testing machine may be of any reliable type of sufficient capacity required for conducting the test and capable of applying the load at a uniform rate. The machine shall be equipped with two steel platens with hardened faces. One of the platens shall be fitted with a ball seating in the form of a portion of a sphere, the centre of which coincides with the centre point of the face of the platen. The other compression platen shall be plane rigid bearing block. The bearing surfaces of the platens shall be maintained within a permissible variation of 0·02 mm from the plane. The movable portion of the spherically seated compression platen shall be held on the spherical seat and shall be such that the bearing face may be rotated freely and tilted through small angles in any direction.

4.2 Test Procedure — The bearing surfaces of the testing machine shall be wiped clean before placing the test piece in position the axis of the test piece shall be carefully aligned with the centre of the upper platen to ensure axial loading. No packing shall be used between the faces of the test piece and the steel platens of the testing machine. The movable platen shall be gently rotated before being brought in contact with the test piece so that uniform seating may be obtained. The load shall be applied uniformly and without jerk or shock and increased continuously till the desired length of the test piece, as specified in the material specification, is obtained.

A maximum rate of strain of 0·15 per minute is recommended.

5. HOT UPSETTING

5.1 If upsetting in hot condition is specified, the test piece shall be heated to the forging temperature appropriate to the material composition and soaked for such period so as to attain uniform temperature and tested as described above. The rate of loading in case of hot upsetting may be faster as compared to cold upsetting. Hot upsetting test may also be conducted under a forging press or hammer provided the test is finished quickly enough so that there is no significant drop in temperature of the test piece. A bearing block equal to the final length to be obtained on test piece after test may be kept by the side of the test piece for guidance.

6. TEST REQUIREMENTS

6.1 At the end of the test, the test piece shall be examined. The interpretation of the appearance of the test piece shall be done in accordance with the material specification.

APPENDIX A

(*Clause* 0.3)

REQUIREMENTS TO BE SPECIFIED IN MATERIAL SPECIFICATION

A-1. In the material specification, where reference to this standard has been made, the following points shall be specified for carrying out the test:

a) The initial and final length of the test piece (*see* **3.1** and **4.2**);

b) Whether the test is to be conducted in the hot or the cold condition (*see* **4** and **5**); and

c) The interpretation of the visual appearance of the test piece after the test (*see* **6.1**).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2